Flare 8 Root Cause And Corrective Action Analysis Report – NSPS Ja

February 22, 2021 through February 24, 2021

In accordance with Title 40, Part 60, Subpart Ja, provided below is information related to the discharge to the No. 8 Flare in excess of 500 lbs in a 24-hour period in accordance with §60.103a(c) and the recordkeeping and reporting requirements of 40 C.F.R. §60.108a(c)(6). This report also includes information required under the Consent Decree entered in United States, et al. v. HOVENSA, LLC, Civ. No. 1:11-cv-0006.

a. A description of the discharge [40 CFR §60.108a(c)(6)(i)]

During the time period of February 22 – 24, 2021, several different events occurred, resulting in this reported exceedance.

- *On February 23, 2021, No. 6 Crude Distillation Unit (CDU6) pressure relief valve (PSV621) located on the Light Naphtha Fractionator relieved to Flare 8 from approximately 3:00AM until 5:00AM. The pressure controller (4100PC0622) downstream of the Light Naphtha Fractionator was found to be defective. The tower was shutdown.*
- *On February 23, 2021, the No. 2 Gas Recovery Unit (GRU) compressor suction drum pressure control valve (4850PY0516B) opened to Flare 8 for 4 minutes. The pressure control was working properly.*
- *On February 23, 2021, during the startup of No. 6 Distillate Desulfurizer (DD6) Unit, pressure relief valve PSV 269 located on the makeup compressor suction drum (D-4605) relieved to Flare 8 for the first time at approximately 9:50 PM. Over the next 10 hours, the PSV opened multiple times, damaging the relief valve and requiring DD6 to shutdown. During these events, both the makeup interstage spillback valve (4600PV0216) and reactor effluent separator pressure control valve (4600PV0133B) opened and closed multiple times to control pressure in DD6. Per the unit startup procedure, the recycle gas scrubber had not yet been started up, resulting in high H_2S gas being present in the recycle gas. The actions of both pressure control valves resulted in H_2S in the makeup suction drum. When PSV269 opened, H_2S was sent to Flare 8 and resulted in an increase in the H_2S concentration to flare. DD6 shutdown procedures were followed and 4600PV0216 was closed by 3:45AM February 24, 2021.*
- *No conclusion could be drawn on the SO_2 release prior to February 23, 2021. A possible cause would be the Amine Recovery Unit ARU4 Regenerator. The Flash Drum and Overhead Receiver levels were erratic, indicating hydrocarbon in flash drum and tower and a high pressure in the line to SRU4 was observed. No link could be confirmed that this resulted in releases to the flare. The release ended after DD6 was shutdown.*

b. The date and time the discharge was first identified and the duration of the discharge [40 CFR §60.108a(c)(6)(ii)] & [Consent Decree Paragraph 60.a]

The discharge was first identified on February 22, 2021 at 0:00 hours and lasted until February 24, 2021 at 03:59 hours.

c. The measured or calculated cumulative quantity of gas discharged over the discharge duration. Include measured H_2S, Total sulfur, SO_2, and flow rate as applicable. [40 CFR §60.108a(c)(6)(iii)-(vii)] and calculations used to determine the quantity of SO_2 that was emitted. [Consent Decree Paragraph 60.b]

Appendix 1 to this document includes the data recorded by the data acquisition and handling system related to the continuous monitoring system located at Flare 8. SO_2 emissions are calculated using the total reduced sulfur quantity measured by analyzer in the flare header, the total flow to the flare, and a 99% conversion of total sulfur to SO_2 per 40 CFR §60.108a(c)(6)(vii.)

d. The steps taken to limit the emissions during the discharge and the duration of the discharge. [40 CFR §60.108a(c)(6)(viii)] and [Consent Decree Paragraph 60.c]

The operational steps taken to mitigate the emissions were:

- *Shutdown of DD6 Distillate Desulfurizer*
- *CDU6 Crude Distillation Unit Light Naphtha Fractionator was shut down.*
- *Removed the hydrocarbons from the ARU 4 Flash Drum to minimize the amount going into the Regenerator and returned to service of Rich Amine to Flash Drum pressure control valve 4830PV502 on February 22. These steps were taken in response to ARU4 upset, but no link to the flare release could be found.*

The duration of the event was 52 hours as described in "b" and "c" above.

e. The root cause analysis and corrective action analysis including an identification of the affected facility, the date and duration of the discharge, a statement noting whether the discharge resulted from the same root cause(s) identified in a previous analysis and either a description of the recommended corrective action(s) or an explanation of why corrective action is not necessary. [40 CFR §60.108a(c)(6)(ix)] and [Consent Decree Paragraph 60.d]

1. *Light Naphtha Fractionator PSV621 opened to Flare 8 due to pressure controller (4100PC0622) malfunction.*
2. *Sudden increase in flow to No. 2 Gas Recovery Unit (GRU) resulted in overpressure in the compressor suction drum, causing it to relieve to flare.*
3. *Makeup Suction Drum pressure relief valve PSV269 opened to Flare 8 during DD6 startup while the recycle pressure control valve was opened to the makeup interstage drum.*
4. *The release occurred from Flare 8, an affected facility under NSPS, Subpart Ja.*
5. *The duration of the event was 49 hours as described in "b" and "c" above.*
6. *This discharge resulted from a similar root cause identified in a previous analysis*
7. *The root cause analysis:*

Root Cause Analysis	*Corrective Action Analysis (or explanation that no corrective is necessary)*	*Status: completed within 45 days or schedule with proposed implementation and completion dates*
The pressure controller (4100PC0622) at 6CDU downstream of the Light	• *CDU6 was shutdown and (4100PC0622) was repaired*	*Completed within 45 days*

Naphtha Fractionator was found to be defective		
Sudden increase in flow to No. 2 Gas Recovery Unit (GRU) above compressor capacity	• *No corrective action. The system functioned as designed*	
6DD startup without the recycle gas scrubber being on.	• *DD6 PSV269 was repaired and returned to service* • *Evaluate controls and procedures to determine if startup can be performed without relieving to flare*	*Completed within 45 days* *Complete evaluation before August 31, 2021*

f. An analysis of the measures, if any, that are available to reduce the likelihood of a recurrence of the discharge resulting from the same root cause or significant contributing causes in the future. The analysis shall discuss all reasonable alternatives, if any, that are available, the probable effectiveness and cost of the alternatives, and whether an outside consultant should be retained to assist in the analysis. Possible design, operation and maintenance changes shall be evaluated. [Consent Decree Paragraph 60.e]

The following corrective measures to reduce the likelihood of a recurrence were completed within the first 45 days following the discharge:

- *CDU6 was shutdown and (4100PC0622) was repaired*
- *DD6 PSV269 was repaired and returned to service*

Evaluation of controls and procedures for DD6 startup is yet to be performed (completion anticipated to be by August 31, 2021).

g. For Acid Gas Flaring Incidents (not Hydrocarbon Flaring Incidents), specifically identify each of the grounds for stipulated penalties in paragraphs 63, 64 and 65 and describe whether the Incident falls under any of those grounds. [Consent Decree Paragraph 60.f]

There is no evidence that acid gas went to the flare during this event.

h. For any corrective action analysis for which corrective actions are required, a description of the corrective action(s) completed within the first 45 days following the discharge and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates. [40 CFR §60.108a(c)(6)(x)] and [Consent Decree Paragraph 60.h for supplement report]

See response to "e" above.

i. If the analysis determines that corrective action is not required, the report shall explain the basis for that conclusion. [Consent Decree Paragraph 60.e]

See response to "e" above.

j. For each discharge from a flare that is the result of a planned startup or shutdown of a refinery process unit or ancillary equipment connected to the flare, a statement that a root cause analysis and corrective action analysis are not necessary because the owner or operator followed the flare management plan. [40 CFR §60.108a(c)(6)(xi)]

Not applicable.

Appendix 1 – DAHS Records

Flare 8 Report

Plant: LIMETREE BAY REFINERY

Report Period: 02/21/2021 23:00 Through 02/24/2021 23:59

Source		FLARE08				
Parameter (Unit)		H2SPPMD (PPM) 001H	H2SPPMD (PPM) 003H	TRSPPM (PPM) 001H	SO2LBS (LBS) 001H	SO2LBS (LBS) 024H
02/21/21	23:00	20.0	19.9	175.5	21.5	499.3
02/22/21	00:00	21.8	20.5	172.9	21.4	500.6 E
02/22/21	01:00	22.4	21.4	181.3	22.4	502.0 E
02/22/21	02:00	23.1	22.5	193.3	22.6	503.8 E
02/22/21	03:00	42.7	29.4	201.4	24.4	508.0 E
02/22/21	04:00	38.7	34.9	204.2	24.2	512.4 E
02/22/21	05:00	23.9 C	35.1	196.4 C	23.5	516.0 E
02/22/21	06:00	26.5 C	29.7	202.8 C	23.6	520.0 E
02/22/21	07:00	22.4	24.2	198.9	23.9	524.1 E
02/22/21	08:00	23.4	24.1	211.9	24.2	527.3 E
02/22/21	09:00	22.7	22.8	219.2	26.3	531.9 E
02/22/21	10:00	24.5	23.5	225.8	25.7	535.7 E
02/22/21	11:00	23.0	23.4	217.4	24.9	538.8 E
02/22/21	12:00	22.2	23.2	215.2	25.4	542.4 E
02/22/21	13:00	21.5	22.2	211.8	24.7	545.2 E
02/22/21	14:00	25.8	23.1	227.0	20.2	543.8 E
02/22/21	15:00	21.3	22.8	221.7	28.9	552.6 E
02/22/21	16:00	20.8	22.6	223.5	26.4	558.6 E
02/22/21	17:00	19.6	20.6	210.7	24.0	562.2 E
02/22/21	18:00	17.2	19.2	199.7	23.2	564.3 E
02/22/21	19:00	15.7	17.5	191.9	22.5	565.9 E
02/22/21	20:00	14.0	15.6	189.2	22.2	567.6 E
02/22/21	21:00	13.6	14.4	191.1	22.4	569.0 E
02/22/21	22:00	12.8	13.5	188.4	22.4	570.9 E
02/22/21	23:00	13.0	13.1	191.1	22.6	571.9 E
02/23/21	00:00	13.3	13.0	191.2	22.6	573.2 E
02/23/21	01:00	13.5	13.3	190.0	22.1	572.9 E
02/23/21	02:00	13.8	13.5	189.4	21.8	572.0 E
02/23/21	03:00	111.1	46.1	431.6	63.1	610.8 E
02/23/21	04:00	97.2	74.0	675.4	106.0	692.6 E
02/23/21	05:00	31.2 C	79.8	374.0 C	44.0	713.2 E

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup

I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

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02/23/21	06:00	14.7 C	47.7	214.2 C	23.7	713.2 E
02/23/21	07:00	13.2	19.7	178.8	20.4	709.7 E
02/23/21	08:00	120.6	49.5	262.2	29.7	715.2 E
02/23/21	09:00	22.5	52.1	165.3	18.7	707.7 E
02/23/21	10:00	15.9	53.0	166.6	19.5	701.5 E
02/23/21	11:00	58.7	32.4	196.4	23.2	699.8 E
02/23/21	12:00	15.6	30.1	158.0	18.4	692.8 E
02/23/21	13:00	14.6	29.7	155.9	14.6	682.7 E
02/23/21	14:00	13.5	14.6	153.0	12.4	674.8 E
02/23/21	15:00	12.7	13.6	147.3	13.9	659.8 E
02/23/21	16:00	13.7	13.3	144.4	7.2	640.7 E
02/23/21	17:00	13.6	13.3	128.7	4.7	621.4 E
02/23/21	18:00	10.2	12.5	121.2	7.4	605.5 E
02/23/21	19:00	10.4	11.4	119.5	7.8	590.8 E
02/23/21	20:00	22.5	14.4	135.0	10.1	578.7 E
02/23/21	21:00	22.8	18.6	149.2	17.2	573.6 E
02/23/21	22:00	8.2	17.8	141.6	17.9	569.2 E
02/23/21	23:00	9.8	13.6	140.3	19.0	565.6 E
02/24/21	00:00	11.6	9.9	142.1	18.5	561.5 E
02/24/21	01:00	28.3	16.6	159.0	15.7	555.1 E
02/24/21	02:00	48.5	29.4	187.1	22.5	555.8 E
02/24/21	03:00	103.5	60.1	237.1	37.5	530.2 E
02/24/21	04:00	38.6	63.5	179.7	26.6	450.7

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